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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/010,428	11/30/2001	Paul R. Evans		5493

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EXAMINER	
GARBER, CHARLES D	

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 02/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/010,428	EVANS, PAUL R.	
	Examiner	Art Unit	
	Charles Garber	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) *9-16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-8 and 17-19* is/are rejected.

7)☒ Claim(s) *5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Election/Restrictions

Claims 9-16 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 6, of 27 January 2003.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 8, 17-19 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 8 and 17 include a load sensor providing a signal for determining or indicating wear. Examiner considers a load sensor provides an indication only of force not directly or exclusively of wear which is diminishing, eroding, or consuming by long or hard use, attrition, or exposure according to The American Heritage® Dictionary of the English Language. While a load sensor may indirectly indicate that wear might be occurring, changes in load may also be occurring due to other factors such as loss of pressure in the pneumatic or hydraulic supply line. Elsewhere, in the claims 7 and 18 Applicant includes a "linear wear sensor". Only such a sensor would be capable of determining or indicating wear. One of ordinary skill would not be enable to determine or indicate wear with a load sensor alone without undue experimentation.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuss et al (US Patent 3,939,690).

Regarding claim 1, Kuss discloses a device for measuring friction and wear using a four ball element 20. The element includes a rotated single top ball equivalent to the first test specimen and three lower balls supported on a plate equivalent to the engaging non-rotated second test specimen. (see figures 1 and 3, column 4 lines 52-61). The items 3, 4, 5, 6, 7 and 8 hold the top ball being worked in the device and are thus considered to be equivalent to a chuck which is "a clamp that holds a tool or the material being worked in a machine" according to The American Heritage® Dictionary of the English Language.

The un-referenced parts shown in figure 3 supporting the three lower balls are considered equivalent to a holder adapted to hold the second test specimen in a position engageable with the top ball (first test specimen) as in the instant invention. Hydraulic unit 21 is a force actuator connected for positioning the holder. The parts holding the top ball, the lower three balls and the hydraulic unit are all acting along a central axis as can seen on inspection of the figures. The hydraulic unit is operable to

establish a compressive test load between the top ball and three lower balls. (column 4 lines 31-34)

Load cell 24 is a load sensor shown in figure 1 connected in the load path that includes the hydraulic unit (actuator) and four balls. The load cell may, as intended, directly measure and provide an output signal indicative of the real-time compressive forces applied thereto during a test.

As for claim 2, figure 1 shows the load cell aligned in the axis between the hydraulic unit and the four ball test element. It may be used for direct detection of the compressive test force therebetween as intended

As for claim 6, figure 4 shows the operation of a torque sensor operably connected to the holder and providing an output signal indicative of the frictional torque generated between the specimens during a test. (See also items 29, 30, 31 which make up the torsional moment or torque sensor, column 4 lines 63-68 and column 5 lines 39-61)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuss et al. (US Patent 3,939,690) in view of Budd et al. (US Patent 5,072,611).

Though Kuss discloses measuring wear (in millimeters) (see figures 6a and 6b wear graphs) Kuss does not do so with a linear wear sensor connected to measure the linear movement of the test specimens during a test. Displacement measurements appear to occur following testing within the device.

Budd, in an apparatus for testing bearings and lubricants, teaches axial position sensor 233. (see figures 2 and 2A, column 4 lines 2-4, 19-28) The sensor measures linear displacement along the axis. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include an axial position sensor in a bearing wear test apparatus. The position signal combined with an axial load signal 236 and control mechanism 260 may be used advantageously to control applied axial load (with load cylinders) to effect desired loading forces.

Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuss et al. (US Patent 3,939,690) in view of Chapman et al. (US Patent 3,045,471).

Regarding claim 8, Kuss does not include a data analysis module connected to the (compressive) load sensor 24 or the module adapted to numerically manipulate the output signal therefrom for determining one of a wear, wear-preventative and friction

characteristic relationship therewith. Kuss rather teaches a torque sensor signal for indirectly indicating wear.

Chapman in figures 4 and 5 teaches what are obviously machine made graphs plotting measured axial load (column 4 lines 32-42) against another parameter as an indication of wear. The measured load is inherently numerically manipulated in order to derive the standard load values shown on the y-axis. The manipulation though not expressly carried out by a module did inherently involve an electronic graphing device which may be considered equivalent to a module or self-contained assembly of some kind.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a module to numerically manipulate load sensor data in order to advantageously graph the relationship between load and other parameters indirectly indicative of wear.

Regarding claim 4, Kuss teaches dial indicator 22 which is a visual display module. Kuss also teaches circuitry shown in figures 4 and 5 which are equivalent to an automated control module. However Kuss teaches the torque sensor rather than the (compressive) load sensor being connected to the circuitry indicative of the real-time torque forces resulting from rather than compressive forces applied to the test specimens during the test.

However, as discussed above with respect to claim 8, Chapman teaches a graphing system connected to a compressive load sensor in order to produce a graph providing a visual display of the relationship between applied load and other wear

parameters. Based on the early date of the invention Examiner considers that such a graphing device would have inherently plotted results in real time rather than storing the data in some sort of memory.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a module providing visual display of measured applied load as in the figure 4 and 5 plots in order to quickly show the relationship between load and other parameters indirectly indicative of wear.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuss et al. (US Patent 3,939,690)

Kuss teaches a hydraulic piston force actuator rather than a pneumatic diaphragm actuator aligned along the axis. However, Examiner takes Official Notice that one having ordinary skill in the art would have known that hydraulic or pneumatic operated piston or diaphragm type actuators are widely known alternatives for applying force each having well known advantages. For example hydraulic actuators may operate at generally higher loads whereas pneumatic actuators dispense with the complicated and messy hydraulic fluid pumping circuits. Diaphragm actuators dispense with moving seal which may develop leaks whereas piston actuators have a greater range of motion.

Regarding claim 17, Kuss, Chapman and Budd as discussed above teach all the limitations of the instant invention except for a load-rod extending along the axis and connected between the holder and the actuator for transmission of the compressive test load therebetween and a linear bearing element through which the load-rod extends for

low-friction linear guidance thereof along said axis. Kuss further discloses a driving shaft 27 equivalent to the load-rod of the instant invention and elements 19, 32, 33, 34, 35, 36, 37 and 38 shown in figure 2 which are considered equivalent to a linear bearing as in the instant invention.

As for claim 18. as discussed above with respect to claim 7, Budd provided advantageous teachings of a linear wear sensor operably coupled (in-line through L-shaped connecting member 28) for direct measurement of linear movement.

As for claim 19, as discussed above with respect to claim 8, Chapman provided advantageous teachings inherenetly for a real time graphing device producing the load wear plots of figures 4 and 5. This was considered equivalent the data analysis module connected to the load sensor and adapted to numerically manipulate the output signal therefrom for determining one of a wear, wear preventative and friction characteristic relationship therewith of the instant invention.

Allowable Subject Matter

Claim 5 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The references discussed above lack and the prior art fails to teach an input reference module connected to supply a reference load signal to a control module, the control module being operably connected to a diaphragm actuator and adapted to adjust the compressive test load established therein according the reference load signal and the real-time output signal from the load sensor.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The additional references cited on the accompanying form PTO-892 though not cited above are provided to indicate other prior art friction/wear testers which include one or more features or limitations in common with the instant invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Garber whose telephone number is (703) 308-6062. The examiner can normally be reached on 6:30 a.m. to 3:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (703) 305-4705. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7725 for regular communications and (703) 308-7725 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

cdg
February 4, 2003

HELEN KWOK
PRIMARY EXAMINER